

REPORT DOCUMENTATION PAGE*Form Approved*
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 05-05-2011		2. REPORT TYPE Master of Military Studies Research Paper		3. DATES COVERED (From - To) September 2010 - May 2011	
4. TITLE AND SUBTITLE Bring Back the Broncos for Austere Environments and Austere Budgets				5a. CONTRACT NUMBER N/A	
				5b. GRANT NUMBER N/A	
				5c. PROGRAM ELEMENT NUMBER N/A	
6. AUTHOR(S) Major Rehwaldt, Christopher J.				5d. PROJECT NUMBER N/A	
				5e. TASK NUMBER N/A	
				5f. WORK UNIT NUMBER N/A	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A				10. SPONSOR/MONITOR'S ACRONYM(S) N/A	
				11. SPONSORING/MONITORING AGENCY REPORT NUMBER N/A	
12. DISTRIBUTION AVAILABILITY STATEMENT Unlimited					
13. SUPPLEMENTARY NOTES N/A					
14. ABSTRACT In this era of slimming budgets and increasing requirements for irregular warfare capabilities, the Marine Corps should procure a Light Attack Armed Reconnaissance aircraft capable of operating with little support in austere environments, and one that costs the Marine Corps much less than the current fleet of aircraft to purchase and operate. The Marine Corps was faced with a similar problem in the Vietnam War and procured the OV-10 Bronco to fill its needs. Though the use of a light turboprop appears to be a step backward in technology, it would be a large step forward in efficiency and effectiveness by utilizing appropriate technology. An aircraft specifically designed for counterinsurgency would bring great flexibility to the Marine Air Ground Task Force and would satisfy many of the current shortfalls. The Marine Corps should procure OV-10 Broncos or a suitable equivalent for the Light Attack Armed Reconnaissance role.					
15. SUBJECT TERMS Light Attack Armed Reconnaissance, LAAR, Light Armed Reconnaissance Aircraft, LARA, Counterinsurgency, Close Air Support, CAS, Intelligence Surveillance and Reconnaissance, ISR, OV-10X, Bronco, OA-X, YOV-10D NOGS, VMO, Hawker Beechcraft, AT-6B, Embraer Super Tucano, EMB-314, Air Tractor, AT-802U, F-35B, JSF, utility aircraft, V-22 escort, off-axis weapons, austere airfield, STOL, STOVL, strike fighter gap, Imminent Fury.					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 22	19a. NAME OF RESPONSIBLE PERSON Marine Corps University / Command and Staff College
a. REPORT Unclass	b. ABSTRACT Unclass	c. THIS PAGE Unclass			19b. TELEPHONE NUMBER (Include area code) (703) 784-3330 (Admin Office)

INSTRUCTIONS FOR COMPLETING SF 298

1. REPORT DATE. Full publication date, including day, month, if available. Must cite at least the year and be Year 2000 compliant, e.g., 30-06-1998; xx-08-1998; xx-xx-1998.

2. REPORT TYPE. State the type of report, such as final, technical, interim, memorandum, master's thesis, progress, quarterly, research, special, group study, etc.

3. DATES COVERED. Indicate the time during which the work was performed and the report was written, e.g., Jun 1997 - Jun 1998; 1-10 Jun 1996; May - Nov 1998; Nov 1998.

4. TITLE. Enter title and subtitle with volume number and part number, if applicable. On classified documents, enter the title classification in parentheses.

5a. CONTRACT NUMBER. Enter all contract numbers as they appear in the report, e.g. F33615-86-C-5169.

5b. GRANT NUMBER. Enter all grant numbers as they appear in the report, e.g. 1F665702D1257.

5c. PROGRAM ELEMENT NUMBER. Enter all program element numbers as they appear in the report, e.g. AFOSR-82-1234.

5d. PROJECT NUMBER. Enter all project numbers as they appear in the report, e.g. 1F665702D1257; ILIR.

5e. TASK NUMBER. Enter all task numbers as they appear in the report, e.g. 05; RF0330201; T4112.

5f. WORK UNIT NUMBER. Enter all work unit numbers as they appear in the report, e.g. 001; AFAPL30480105.

6. AUTHOR(S). Enter name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. The form of entry is the last name, first name, middle initial, and additional qualifiers separated by commas, e.g. Smith, Richard, Jr.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES). Self-explanatory.

8. PERFORMING ORGANIZATION REPORT NUMBER. Enter all unique alphanumeric report numbers assigned by the performing organization, e.g. BRL-1234; AFWL-TR-85-4017-Vol-21-PT-2.

9. SPONSORING/MONITORS AGENCY NAME(S) AND ADDRESS(ES). Enter the name and address of the organization(s) financially responsible for and monitoring the work.

10. SPONSOR/MONITOR'S ACRONYM(S). Enter, if available, e.g. BRL, ARDEC, NADC.

11. SPONSOR/MONITOR'S REPORT NUMBER(S). Enter report number as assigned by the sponsoring/ monitoring agency, if available, e.g. BRL-TR-829; -215.

12. DISTRIBUTION/AVAILABILITY STATEMENT. Use agency-mandated availability statements to indicate the public availability or distribution limitations of the report. If additional limitations/restrictions or special markings are indicated, follow agency authorization procedures, e.g. RD/FRD, PROPIN, ITAR, etc. Include copyright information.

13. SUPPLEMENTARY NOTES. Enter information not included elsewhere such as: prepared in cooperation with; translation of; report supersedes; old edition number, etc.

14. ABSTRACT. A brief (approximately 200 words) factual summary of the most significant information.

15. SUBJECT TERMS. Key words or phrases identifying major concepts in the report.

16. SECURITY CLASSIFICATION. Enter security classification in accordance with security classification regulations, e.g. U, C, S, etc. If this form contains classified information, stamp classification level on the top and bottom of this page.

17. LIMITATION OF ABSTRACT. This block must be completed to assign a distribution limitation to the abstract. Enter UU (Unclassified Unlimited) or SAR (Same as Report). An entry in this block is necessary if the abstract is to be limited.

United States Marine Corps
Command and Staff College
Marine Corps University
2076 South Street
Marine Corps Combat Development Command
Quantico, Virginia 22134-5068

MASTER OF MILITARY STUDIES

TITLE:

Bring Back the Broncos for Austere Environments and Austere Budgets

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

AUTHOR:

Major Christopher J. Rehwaldt

AY 10-11

Mentor and Oral Defense Committee Member: Dr. Mark H. Jacobsen

Approved: Mark Jacobsen

Date: 5 May 2011

Oral Defense Committee Member: Dr. Robert Bruce

Approved: Robert Bruce

Date: 05 May 2011

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

QUOTATION FROM, ABSTRACTION FROM, OR REPRODUCTION OF ALL OR ANY PART OF THIS DOCUMENT IS PERMITTED PROVIDED PROPER ACKNOWLEDGEMENT IS MADE.

Executive Summary

Title: Bring Back the Broncos for Austere Environments and Austere Budgets

Author: Major Christopher J. Rehwaldt

Thesis: In this era of slimming budgets and increasing requirements for irregular warfare capabilities, the Marine Corps should procure an aircraft capable of operating with little support in austere environments, and one that costs the Marine Corps much less than the current fleet of aircraft to purchase and operate. The Marine Corps should procure a Light Attack Armed Reconnaissance aircraft that can provide the Marine Air Ground Task Force with the necessary tools to fight and win in the twenty first century.

Discussion: Currently the Marine Corps is delivering an adequate amount of Close Air Support to its forward deployed units, however at a great cost to the longevity of its assets and in terms of the required support footprint. It is recognized that there are shortfalls in intelligence and more Intelligence, Surveillance, Reconnaissance assets are need in Afghanistan. With the questionable future of the F-35 Joint Strike Fighter, the strike fighter gap issue, the lack of an adequate escort platform for the MV-22, and significant inefficiencies in how the Marine Corps' airpower supports its Marines, it is evident there are shortfalls in current aircraft capabilities. A cheap, light, turboprop aircraft specifically designed to conduct Close Air Support and Intelligence, Surveillance, Reconnaissance, and has an ability to provide limited utility support, could fill many of the operating force's shortfalls. This Light Attack Armed Reconnaissance aircraft should be able to operate from austere sites and amphibious ships, and should be easy and inexpensive to maintain and supply.

Conclusion: The Marine Corps was faced with a similar problem in the Vietnam War and procured the OV-10 Bronco to fill its needs. Though the use of a light turboprop appears to be a step backward in technology, it would be a large step forward in efficiency by utilizing appropriate technology. An aircraft specifically designed for counterinsurgency would bring great flexibility to the Marine Air Ground Task Force and would satisfy many of the current shortfalls. The Marine Corps should procure OV-10 Broncos or a suitable equivalent.

Preface

The genesis for my idea to research and write about this subject came from my experiences during Operation Iraqi Freedom. As a UH-1N helicopter commander and element leader in Iraq, the preponderance of the sorties I flew were to provide Intelligence, Surveillance, and Reconnaissance (ISR) support to coalition troops. Because the Marine Corps' UH-1Ns have offensive weapons, we also had the capability to provide Close Air Support (CAS) for coalition troops, but infrequently did so. After many flight hours conducting ISR and very few providing CAS, it occurred to me that I could provide better support to the coalition ground troops and more efficiently, flying a simpler, cheaper type of aircraft. I realized that a light, prop-driven, fixed-wing aircraft could not only be more effective than my UH-1N, but it would also be more effective than the AH-1Ws, the F/A-18s, and the AV-8Bs, which also conduct these ISR and CAS missions.

During one of the convoy escort missions I conducted in Iraq, the enormity of the logistics required to support coalition aviation operations became somewhat apparent to me. The convoy I was guarding was bound for Al Asad, the Marine's jet base in Al Anbar Province, and centered on over 100 tractor-trailers laden with fuel. At this point, it occurred to me that the fuel requirement in Iraq was really much larger than what I was seeing. In the days or weeks before, someone else had escorted the fuel my helicopter was using that allowed me to escort the fuel bound for the aviation units in Al Asad, not to mention the fuel requirements of all of the tactical ground vehicles escorting and transporting the fuel bound for Al Asad. Though it was a massive convoy, I realized that it was only a small sliver of the logistical footprint pie required to provide around the clock jet ISR and CAS to the Marines and soldiers in Al Anbar Province. When I considered my first thought, that the vast majority of the flight time these jets from Al Asad flew was spent conducting ISR, it seemed even more inefficient to me. If the Marine Corps' Air Combat Element (ACE) expects to continue to conduct the majority of its missions in support of counterinsurgency (COIN), the Marine Corps should consider a simpler, lighter, aircraft with a much smaller logistical footprint to fulfill its COIN needs.

Introduction

The purpose of this paper is to explore the concept of adding a light, prop driven, fixed-wing aircraft to the Marine Corps' inventory. This paper will examine the present dilemmas faced by the United States Government, as well as problems the Marine Corps must deal with to ensure success in future irregular and conventional conflicts. In Iraq and Afghanistan, the Marine Corps was and is using high-tech aircraft to combat a low-tech enemy. Though the Marine Corps' approach is effective, its high-tech aircraft are wearing out more quickly than expected, and are expensive to operate and maintain. In this era of slimming budgets and increasing requirements for irregular warfare capabilities, the Marine Corps should procure an aircraft capable of operating with little support in austere environments, and that costs the Marine Corps much less than the current fleet of aircraft to purchase and operate.

Preparing for the Future

In the last 70 years, the conflicts the United States has been involved in have alternated between regular and irregular. As a result, military doctrine has swung back and forth like a pendulum, between opposition strategies for conventional and irregular warfare. After World War II and the Korean War in which the United States faced conventional opponents, America's military was prepared to wage conventional warfare. America's next war, against the communist Vietnamese forced the United States to adapt to an opponent who largely used irregular methods of warfare. Part of the aftermath of the unpopular war in Vietnam was that doctrine from the era was abandoned. As such, the term "counterinsurgency" was replaced it with "low intensity conflict." The United States Military's doctrine had shifted back towards conventional warfare and adopted the "Air-Land Battle" doctrine, which supported conventional warfare.¹ America's military used this conventional doctrine throughout the remainder of the Cold War, in Iraq in 1991, and again in Iraq in 2003. After Coalition Forces defeated the Iraqi Military during the

initial invasion in 2003, the conflict shifted from a conventional to an irregular conflict. In 2003, the doctrine pendulum began to swing back towards the irregular side.

Presently, with the Iraq campaign nearly complete and the campaign to secure Afghanistan in full swing, the military's equipping and training is largely oriented to fighting an enemy who uses irregular means. However, with world powers such as China, which is gaining strength and has uncertain intentions, and belligerent countries such as Iran and North Korea threatening to wage war on our allies, the prospect of conventional warfare is certainly relevant. Historically though, since 1816, only 17% of all conflicts in the world were conventional, while 83% were irregular in nature.² In the last decade, of the roughly 30 major conflicts, only four were between nations.³ When viewed as a whole, the evidence would suggest that the United States Military should primarily prepare for a wide array of irregular threats, yet still maintain a significant, robust conventional warfare capacity.

The 2010 National Security Strategy perhaps best describes the strategic direction for preparing for the future.

We will continue to rebalance our military capabilities to excel at counterterrorism, counterinsurgency, stability operations, and meeting increasingly sophisticated security threats, while ensuring our force is ready to address the full range of military operations. This includes preparing for increasingly sophisticated adversaries, deterring and defending aggression in anti-access environments, and defending the United States.⁴

In terms of rebalancing the force for the future the, 2010 Quadrennial Defense Review, an interpretation of the National Security Strategy, states that the priority objectives of the defense strategy are to: "prevail in today's wars; prevent and deter conflict; prepare to succeed in a wide range of contingencies, both near- and longer-term."⁵ The National Military Strategy, which provides the Department of defense the ways and means for implementing the National Security Strategy and Quadrennial Defense Review states: "Our strategy, forged in war, is focused on fielding modular, adaptive, general purpose forces that can be employed in the full range of

military operations.”⁶

The National Security Strategy, Quadrennial Defense Review, and the National Military Strategy all provide a similar message for preparing for the future. These three documents state that the military should prepare for a wide range of threats, with the majority of those threats being irregular in nature. Therefore, the message rendered, is that the military must, as the Quadrennial Defense Review states, “prevail in today’s wars,”⁷ or more specifically, irregular warfare, but at the same time not neglect the threat of a conventional war.

In most regards, the Marine Corps is currently training and equipping its forces to face irregular opponents, yet it still maintains the ability to wage conventional warfare. To this end, the Marine Corps’ Air Combat Element (ACE) devotes more time to training for irregular threats than it does for conventional ones. Though the ACE’s aircraft were designed to be optimally used in conventional warfare, the ACE has adapted and used its aircraft effectively in the current irregular fight. Perhaps because the development and fielding of military aircraft is typically a lengthy process, it is not feasible for aircraft design to keep pace with doctrine. The result being that aircrews must adapt their tactics, techniques, and procedures (TTPs) to the threat they are facing. Though the ACE is effective at waging irregular warfare, its aircraft are wearing out prematurely and because of budgetary limitations, future aircraft programs are at risk of being cut. To add to this, the Marine Corps’ aircraft are inefficient and are not well suited for the role of providing armed escort for the new MV-22 Osprey.

Present Day Issues

1) **Federal Budget:** The present fiscal condition of the United States government is of concern and the outlook for the future is at best, one of a slow recovery. With the national debt at the center of debate in Washington, Congress is looking for ways to cut federal spending in an effort to keep the federal debt ceiling at the present \$14.3 trillion.⁸ The Department of Defense

(DoD) has recognized the severity of the situation and on January 6, 2011, Secretary of Defense Robert Gates announced a series of cost cutting measures that the United States military services will undertake. The Marine Corps, being hit the hardest by this measure, plans to reduce its total strength by 20,000 Marines over the next four years. The costly Expeditionary Fighting Vehicle program was cut, and an ultimatum was issued about the F-35B Joint Strike Fighter (JSF), the Marines' replacement for the F/A-18, AV-8, and EA-6. If program engineers are unable to resolve the expensive aircraft's technical issues and get it to pass operational evaluation by 2013, it may be cut as a measure to relieve budgetary pressure.⁹ As America's fiscal situation will likely continue to worsen, the Marine Corps should anticipate pressure to cut spending and should plan for reduced budgets rather than making reactionary cuts to nearly mature programs.

2) Program Cuts and Implications: Because the JSF is planned to replace the Marine Corps' Tactical Air (TacAir) fleet of F/A-18C/D Hornets, AV-8B Harriers, and the EA-6B Prowlers, the new jet's fate has rather large implications on the future of Marine aviation and how the Marine Air ground Task Force (MAGTF) will fight as a whole. There are several possibilities at this point. If the JSF program is cancelled or seriously scaled back, the Marine Corps will have to re-think its strategy altogether. Many of the Marine Corps' TacAir aircraft are reaching the end of their airframe service lives and will need a replacement regardless of how the F-35 fares. The Commandant of the Marine Corps, General James F. Amos, stated that service life extensions will be sought for the aging F/A-18 fleet if further delays in the F-35 program occur. Although General Amos has announced that he is confident that the F-35 program will ultimately be successful,¹⁰ further delays will likely limit the Marine Corps' TacAir readiness if TacAir aircraft reach their service limits and are retired without a replacement.

The cancellation of the F-35B, the Short Take Off Vertical Landing (STOVL) variant that the Marine Corps is in the process of procuring is a second potentially detrimental decision that

could be made. If the F-35B's development encounters more engineering issues, or DoD budgets continue to decrease, the program will be at more risk. To add more pressure, the United Kingdom recently opted to procure the C variant, designed for use on aircraft carriers, instead of the B model.¹¹ Now that fewer B model aircraft will be manufactured, the unit cost will certainly go up. If the DoD cancels the F-35B STOVL, there will be no choice for Marine Corps but to procure only the F-35C carrier variant. In this situation, the Marine Corps would have a replacement for its ageing TacAir fleet with the F-35C, but would lose its STOVL capability once the AV-8B Harriers are retired. This loss would mean that Marine TacAir assets would only be able to operate from the Navy's aircraft carriers or from well-established, large airfields, and TacAir could no longer operate close to the Marines from small deck amphibious ships and small expeditionary airfields. With Marine Corps TacAir aircraft confined to operating from the Navy's large nuclear aircraft carriers and unable to operate from shorter expeditionary airfields, basing options available in any given AO would be far fewer. As a result, MAGTF commanders would largely lose the direct TacAir support they presently enjoy and the general support they would be provided instead, would be less responsive and less situationally aware. Whatever happens to the F-35B can guessed about, however the Marine Corps must be prepared to operate as a MAGTF in austere theaters of war.

3) Strike Fighter Gap: To complicate matters, the Marine Corps' existing aviation assets are fast wearing out. Since the War on Terrorism began, the Marine Corps has greatly increased the utilization rates of its aircraft to reduce the human toll of the war. Because of the increased use, the Marine Corps' aircraft are wearing out more quickly than expected. To add to this situation, the replacement for the Marine Corps TacAir aircraft is the F-35, which is behind in development. Because of these two factors, there will be fewer total aircraft during the transition

from old to new. This forecasted shortfall of fighter and attack aircraft is known as the "strike fighter gap."

One proposed option for the Marine Corps to avoid the strike fighter gap is to extend the service lives of a number of its F/A-18C/Ds. The aircraft was built with a service life of 6,000 flight hours. Later that limit was raised up to 8,000 hours, then later to 8,600 hours through increased inspections. The proposal is to again raise some number of aircraft to 10,000 flight hours through inspections and by reworking portions of those aircraft. Each F/A-18C/D that goes through the process will gain 1,400 flight hours to its lifespan at the cost of \$26 million each.¹² That works out to \$18,500 for each additional flight hour, on top of the estimated \$19,000¹³ it costs now. These service life extensions could be costly, but possibly necessary to provide Marine TacAir a means to support Marines on the ground, if there is no alternative.

4) Overkill and Inefficiency: In the first stages of Operation Iraqi Freedom (OIF), aircraft employed their weapons systems on a large percentage of sorties. However, after Coalition forces crushed the Iraqi defenses, the nature of the conflict changed from a conventional war into a counterinsurgency and weapons utilization decreased. Because insurgents can hide amongst the population and attack at the time and place of their choosing, U.S. airpower was spending more and more time trying to find the insurgents and less time engaging them. In the last several years of OIF and now in Afghanistan in Operation Enduring Freedom (OEF), multimillion-dollar F/A-18s and AV-8Bs spent and are spending the majority of their time during Close Air Support and Intelligence, Surveillance, and Reconnaissance (CAS/ISR) sorties, conducting mostly ISR and performing very little CAS. The same is true on the rotary-wing side of the ACE. Therefore, aircraft presently conducting CAS/ISR missions spend most of their flight time in an orbit at low speeds and never use many of the aircraft's capabilities. While this does not pose any immediate negative impact on CAS/ISR mission capability, the negative impact comes from

the inefficiency. The high expense of operating advanced jets and helicopters comes at a premium to the Marine Corps' limited resources. To save those limited resources, the Marine Corps should procure a simpler more efficient aircraft for the counterinsurgency CAS/ISR role.

5) MV-22 Escort Gap: An additional complication is the need to protect the MV-22 Osprey. Because the Osprey has a large flight envelope, flying like an airplane and landing like a helicopter, there is presently no aircraft in the Marine Corp's inventory with similar enough flight characteristics to provide adequate armed escort in hostile environments. TacAir aircraft are well suited to escort MV-22s while in airplane mode, however, as the MV-22 transitions to helicopter mode for landing, jet aircraft fly too high and too fast to effectively determine whether the MV-22's landing zones are clear of threats. When MV-22s are in helicopter mode on short final to their landing zone, they are at the peak of their vulnerability, and for this reason, the Marine Corps presently uses slower armed helicopters to escort MV-22s. The current TTP using armed helicopters, such as H-1 Cobras and Hueys, is to proceed to the planned landing zone in advance of the MV-22s landing time. The H-1s insure the landing zone is safe, then go into an orbit above the landing zone in order to be in a position to react to any threats that may appear. The MV-22s then drop down from altitude and begin their transition to helicopter mode for landing.¹⁴ Though this method has been effective in minimal threat environments, the large speed differential between escort helicopters and MV-22s in airplane mode restrains the helicopters from keeping pace throughout the entire mission. As a result, and the aircrews must use advanced planning to designate rendezvous positions and times.

There are several problems with the way AH-1 Cobras and UH-1 Hueys currently escort Ospreys. First, it does not offer any flexibility for follow on landings at other distant landing zones, unless other escort aircraft have been pre-coordinated to be at those landing zones at the pre-coordinated times. Second, if the escorting aircraft arrive early, they are telegraphing the

arrival of the MV-22s and may give a keen enemy time to set an ambush. Third, if either the MV-22s or the H-1s proceed to the wrong zone, or are late, the mission will likely be aborted. Fourth, because the H-1s are not attached to the MV-22 flight for the entirety of the mission, they provide no protection during the ingress to the objective area, and must join up with the MV-22s during the landing phase. As any aviator with night experience would agree, joining up multi-ship formations at night is very tasking and can quickly become dangerous if anyone in the flight loses situational awareness or does not understand the plan. Simple plans offer better flexibility and when the friction from combat and the night environment takes its toll, the plan with fewer moving parts tends to achieve greater success and presents less risk.

The Solution

The solution for all of these issues would be for the Marine Corps to procure a Light Attack Armed Reconnaissance (LAAR) aircraft. This aircraft should be a light, cheap, turboprop aircraft, equipped with appropriate technology, and capable of almost any mission in any location. The LAAR aircraft should be able to land and takeoff on short rough runways, operate from amphibious ships, and have the sensors and weapon systems to be an effective CAS/ISR platform. It should have long endurance to enhance situational awareness, robust communication systems to spread information, a small cargo hold to provide limited utility support, and survivability systems to keep risk to aircrew low. Finally, the LAAR aircraft should be able to operate with little support and routine maintenance must be simple.

The June 2010 Marine Corps Operating Concepts outlines the direction for the Marine Corps to move towards in order to meet the challenges of the future. It states that aviation units should seek to become lighter in terms of logistical and maintenance footprint and that they should improve flexibility. Specifically, it supports the LAAR concept by stating:

there may be a requirement for a light-attack platform to add to the ACE inventory; one which can perform multiple missions; filling in the mission seams between our Joint Strike Fighter (JSF), MV-22 and rotary aircraft – including escort of assault aircraft, point resupply and medical evacuation¹⁵

While procuring new equipment is exceedingly difficult when resources are scarce, procuring equipment that is relatively inexpensive and fills many of the needs of the Marines across the Corps makes sense. Putting scarce money into a platform that can simultaneously provide needed targeting and intelligence gathering, offensive air support, utility support, and command and control should please many communities and be a force multiplier for the ACE. The Commandant of the Marine Corps, General James F. Amos said: “During my four years as Commandant of the Marine Corps, we will rededicate ourselves to our frugal roots.”¹⁶ The LAAR aircraft would be inexpensive to procure and operate, while providing the Marine Corps the support it needs.

As discussed, if the F-35 program encounters more problems, the Marine Corps must make some critical decisions about future aircraft procurement. The way Marine TacAir supports the MAGTF will certainly change if the Marine Corps does not have an attack aircraft that can operate from amphibious ships or austere airfields. If the Marine Corps had a number of LAAR aircraft, it could insure direct support be provided to the MAGTF. A LAAR aircraft that can operate close to the Marines, from amphibious ships and austere airfields, means responsive CAS for the Ground Combat Element (GCE), regardless of how the F-35 fares.

Filling a portion of the fighter squadrons’ deployments with LAAR squadrons could mitigate the strike fighter gap by reducing the demand for F/A-18C/Ds. The funds the Marine Corps would use to squeeze a few more hours out of its ageing F/A-18C/Ds could be used towards much cheaper aircraft to take a significant portion of TacAir’s counterinsurgency workload during the transition to the F-35. Doing so would not only positively affect the United

States' endeavors in irregular war, but it would also allow the reduced numbers of TacAir aircraft to prepare for conventional threats.

The MV-22 escort shortfall is after all the result of design limitation. A platform with the proper speed characteristics and the proper weapons systems could fill the MV-22 escort void. How H-1s currently escort MV-22s is a technique, but it is complicated, inflexible, and much of the MV-22's flight is unprotected. By an escort aircraft taking off with the transport package and remaining attached throughout the flight, several issues would be resolved. The unnecessary added variables of joining up in potentially hostile territory would be removed, needed flexibility would be gained, allowing the MV-22s freedom of movement throughout the combat zone, and greater protection would be provided to the MV-22s and their valuable passengers. A LAAR aircraft of a simple turboprop design would have a similar performance envelope to the MV-22 and would thus be able to attach to the MV-22s throughout their mission. For this reason, and given the proper weapon systems, the LAAR aircraft would be able to fill the escort gap for the Marine Corps' vulnerable and valuable MV-22s.

Vital Attributes for a LAAR Aircraft

1) **Efficient:** United States Central Command Chief, Gen. David H. Petraeus, has argued that a method the insurgents use to fight the West is to exhaust our resources.¹⁷ Operating efficiently is not only important the 35th Commandant of the Marine Corps Commandant's Planning Guidance has directed it:

The future security environment requires a mindset geared toward increased energy efficiency and reduced consumption, thus allowing us to operate lighter and faster. We will aggressively continue our pioneering efforts in energy through our Expeditionary Energy Office, with goals of reduced energy demand in our platforms and systems, self sufficiency in our battlefield sustainment, and a reduced expeditionary foot print on the battlefield.¹⁸

Using a LAAR aircraft specifically designed for counterinsurgency would save the Marine Corps and ultimately the United States valuable resources for other endeavors. The current jets filling

CAS sorties cost between \$10,000 and \$19,000 per flight hour to operate,¹⁹ whereas an aircraft like the Super Tucano would cost hundreds of dollars per flight hour.²⁰ A turboprop LAAR aircraft would use a small percentage of the fuel that a jet would use for a given sortie. When the fuel used for the tanker support required for jets is considered, a LAAR squadron would use 5% of the fuel required for a jet squadron to provide the same number of sorties.²¹ Furthermore, because of the LAAR aircraft's mechanical simplicity, the number of maintenance personnel required would be far fewer than what is required for many of the other aircraft in the ACE. These factors have a compounding effect. If a Forward Operating Base (FOB) has fewer maintenance personnel, it will need fewer support personnel such as doctors, military police, and cooks, etc. With a greatly reduced requirement for fuel and a reduced number of required personnel, the logistics requirement would correspondingly decrease significantly.

2) Long Time on Station: The endurance of a LAAR aircraft is an important factor for several reasons. Most importantly is situational awareness, which is particularly important for the conduct of complex missions like Forward Air Controller (Airborne) (FAC(A)), Tactical Air Coordinator (Airborne) (TAC(A)). Helicopters and jets generally have short endurances of two hours or less, and when transit times to and from an objective area are factored in, only a fraction of the total sortie time may be left to conduct a mission. For example, to fill a FAC(A) role that will last for five hours, as many as 10 sorties may require sourcing, depending on how far away the providing aircraft are based. With this constant changing of hands, consistency is poor and situational information is lost during turnover. Conversely, because of long endurance, one LAAR sortie would likely be able to complete this entire five hour FAC(A) role, in the end rendering a higher degree of success. Granted, with tanker support, a single section of jets could also complete this same five hour requirement, however at a much higher cost in terms of support and efficiency.

The other major benefit gained by an aircraft having long endurance is flexibility. In the fog and friction of warfare, situations change, and having an aircraft that is more adaptable and less tied to its refueling point in the rear gives its aircrew more choices. Because range is also a factor of an aircraft's endurance, an aircraft with a longer range has many more recovery options available to it. In the end, these options create flexibility for the MAGTF commander.

3) Austere Airfield Capable: The prospective LAAR aircraft should have Short Take Off and Landing (STOL) capability and be able to operate from austere airfields. Having a rugged design which allowing the LAAR aircraft to land on, and take off from hastily prepared dirt fields or straight secondary roads of sufficient length and grade would give the aircraft many advantages over other aircraft designed for prepared runway use only. With an austere airfield capability, the LAAR aircraft would have much greater flexibility to refuel and rearm in many more locations, which would allow for much quicker response times and better persistence to support ground forces in need. This capability would also enhance communication within the area of operations (AO). Prior to complex missions, supporting aircrew much prefer to land in the GCE commanders "back yard" for a face-to-face brief,²² rather than to ascertain his intent via a series of e-mailed power point slides. GCE commanders often request a leader's reconnaissance to get the birds eye view of their AO. Having the ability to pick out a 1,000 foot straightaway on an unimproved road to use as a landing strip is an important attribute that would bring increased flexibility, utility, and efficiency to the MAGTF.

4) An Off-Axis Gun: An off-axis machine gun or cannon is an extremely effective weapon in the conduct of missions in a counterinsurgency role. The typical mission type assigned, CAS/ISR, often involves a majority of a supporting aircraft's time on station loitering over a particular objective area or various areas of interest. If the loitering aircraft overhead observes a threat, it can almost immediately engage and suppress or destroy the threat if fitted

with off-axis guns. By contrast, if the loitering aircraft is equipped with only forward firing weapons, it must break contact and set up for an attack run. By breaking away from the threat, it is more likely that the attacking aircrew will lose visual or sensor contact with the threat. If there is no FAC or Joint Terminal Attack Controller (JTAC) on scene that can maintain contact, or positive identification (PID), while the attacking aircraft is maneuvering for attack, the aircrew must regain PID of the target before engaging it. In a counterinsurgency scenario, it is likely that the target would be a person dressed like everyone else, trying to evade, and extremely difficult to reacquire. Furthermore, breaking away from the threat gives the threat time to evade, prepare for the attack, or in the worst case scenario, employ a Man Portable Air Defense Systems (MANPAD) against the aircraft as it turns tail to set up for a forward firing attack. In the same manner that an AC-130 employs its sensors and weapons, so too could a LAAR aircraft with a turreted gun.

A LAAR with an off-axis gun would be of significant importance in the escort role. If an escort aircraft only possess fixed forward weapons, it is limited in its ability to suppress threats to the package of transport aircraft it is escorting. With fixed guns, the escort must maintain a position far enough behind the package to be able to suppress any threats. If the escort is too close or ahead of the package, it must maneuver to suppress if a threat engages the package. By the time the escort can reorient toward the threat, the package will have likely cleared the threat's engagement area, thus making any shots fired by the escort, punishment shots instead of the desired suppressive fire. If the escort is fixed behind the escorted platform, it loses the flexibility to sprint ahead to check known danger areas before the package's arrival, thus making the escort purely reactionary. Conversely, if the escort possesses off-axis guns, it can suppress a threat to the package from any relation. The escort aircraft then has freedom to position itself, behind, along side, or in front of the package, allowing it to provide a good deal better protection.

5) Utility Capable: The Marine Corps should select an aircraft with some utility capability for the LAAR role. Having the ability to provide limited resupply, conduct casualty evacuations, and conduct mundane but important tasks like delivering mail to the FOBs would make the LAAR aircraft much more important to the MAGTF than an aircraft with no useable cargo compartment. Because the United States' strategy for counterinsurgency, known as distributed operations, calls for forces to be spread out amongst the population in small FOBs rather than keeping all forces in a handful of large bases, the logistics requirement is greatly increased. A utility aircraft that has the ability to transport small but important items or people to the outlying FOBs could take some of the logistics workload, or at least act as a backup if primary means of transportation are not available. With one of the largest threats to the Logistics Combat Element (LCE) in OEF being the Improvised Explosive Device (IED), the flexibility to move important people and cargo via aircraft is a valuable option. An increased logistics capability ultimately gives the GCE commander more flexibility to deploy his forces with less risk of overextending his lines of supply.²³ Though there are multiple other aircraft that perform the bulk of the logistics work, A versatile LAAR aircraft with utility capability would only provide the MAGTF commander with more flexibility.

6) Amphibious Capable: The Marine Corps often calls itself "America's 911 force." This is because the Marine Corps operates its total force packaged, Marine Expeditionary Units (MEUs) from the Navy's Landing Helicopter Assaults (LHA) and Landing Helicopter Docks (LHD) amphibious ships. Because of the mobility the Navy provides, the Marine Corps can quickly thrust America's power nearly anywhere on the globe. Presently within the MEU, the ACE employs various helicopters as well as AV-8Bs that provide the MEU a host of capabilities. In the 1980s, though not fitted with arresting hooks, the Marine Corps' OV-10A and OV-10D Broncos periodically operated from the decks of LHAs, LHDs, and aircraft carriers.²⁴ The

STOL capability of the OV-10 meant that it could land or takeoff in 740 feet, within the 844 foot deck length of a LHD or the 820 foot length of a LHA.²⁵ If the Marine Corps were to invest in LAAR aircraft, it should select a model capable of operating from LHAs and LHDs.

Perspective LAAR Aircraft for the Marine Corps

This study selects the following aircraft as plausible candidates because they possess many or all of the attributes a Marine Corps LAAR aircraft should possess: Hawker Beechcraft AT-6B, Embraer Super Tucano EMB-314, Air Tractor AT-802U, and the Boeing OV-10X Bronco.

1) Hawker Beechcraft AT-6B: This light weight, low wing, single engine, turboprop aircraft is a modified T-6 Texan II, which has proven its trustworthiness as a trainer for the United States Navy and Air Force since 2000. It is crewed by two, seated in tandem, in ejection seats under a large canopy. Glass cockpits and a turreted camera and FLIR on the belly equip it for ISR. Its six hard points, allow for laser and GPS 500 pound bombs, various missiles, 2.75" rockets, .50 caliber gun pods, and external fuel tanks. As far as performance, it has a max speed of 310 nautical miles per hour and a range of 850 nautical miles. On internal fuel, the AT-6 has an endurance of three hours and with external fuel and stores, up to 6 hours. With a standard tricycle type landing gear system, only seven inches of propeller ground clearance, a take off distance of 1,435 feet, and a landing distance of 2,425 feet, the AT-6 is really only capable of operating from prepared fields.²⁶

2) Embraer Super Tucano EMB-314: The Super Tucano is generally similar to the AT-6B in terms of arrangement and overall design. It is a Brazilian built aircraft which first flew in 1993 and went into service in the Brazilian Air Force in 2003. Also crewed by two in a tandem arrangement, it has glass cockpits and ejection seats. With its five hard points and 3,300 pounds of capacity, it can carry 500 pound guided bombs, various air-to-air and air-to-ground missiles, rockets, and extra gun pods. Each wing has in internal .50 caliber machine gun with 200 rounds

of ammunition. The Super Tucano has a top speed 270 nautical miles per hour and can stay aloft for 6.5 hours on internal fuel and longer external fuel tanks.²⁷

3) Air Tractor AT-802U: This especially robust aircraft would be able to truly operate from forward, austere positions. Because Air Tractor originally developed the 802 for civil use in agriculture and firefighting, it can land almost anywhere, and it requires very little routine maintenance. It has 9 hard points which allow it to carry two 500 pound laser guided bombs, Hellfire missiles, rockets, and fixed forward .50 caliber Gatling guns. With a full fuel and weapons load, it is capable of taking off and landing from a 1,400 foot unimproved dirt strip and staying airborne for up to 10 hours. Because of the 802's cavernous internal space, it has plenty of room to be fitted with various sensors, communications, or mission specific gear. The 802U has a tandem crew arrangement with dual controls and glass cockpits. As for survivability however, the 802U does not have ejection seats, but boasts a survivable design through a steel cage, armor, and airbag system.²⁸

4) Boeing OV-10X Bronco: Boeing is working on a plan to reopen its assembly line for the OV-10 Bronco.²⁹ Though there is little information on Boeing's plan, the OV-10X bears a resemblance to the YOY-10D Night Observation Gunship System (NOGS) that was developed and fielded during the Vietnam War. The new OV-10X, will be fitted with upgraded engines and be constructed of more efficient materials, giving it up to 6.2 hours of endurance and a service ceiling of 30,000 feet. Its sponsons will house four .50 caliber machine guns and with its five hard points, the new OV-10 will have the option of carrying a turreted 30 millimeter cannon, up to 16 Hellfire missiles, four 500 pound smart bombs, rocket pods, air-to-air missiles, and/or fuel tanks. It will have a modern glass cockpit, with upgradable avionics and a FLIR system with a designator and infrared pointer. For survivability, modern automatic countermeasures, cockpit armor, and ejection seats will also be part of the package. The moderately sized rear

cargo area will have a capacity for a 3200 pound payload, or room for five troops. With the rear seat removed, the Bronco is capable of carrying two stretchers and a medic for medical evacuations. The twin-engine design, utility capability, off-axis cannon, and its amphibious ability give the new Bronco a definite edge on its competitors for the LAAR role.³⁰ At an estimated cost of \$15-20 million per aircraft, and an estimated operating cost of \$6,913 per flight hour, make the OV-10X Bronco more desirable when compared to the \$75 million dollar F-35B, which will cost at least \$30,700 per hour to operate.³¹

Solutions to Similar Problems

1) The Air Force (present day): The Air Force has recognized the drawbacks of using its fighters against insurgents and is in the process of selecting a LAAR aircraft for counterinsurgency operations. The aircraft the Air Force is looking at for the role all exist as production, light turboprops. Namely, the Super Tucano EMB-314 and the AT-6B Texan II are the front-runners. The Air Force's strategy is that considerably cheaper aircraft using off the shelf technology, with a fraction of the logistical footprint will greatly reduce operating costs. The planned LAAR aircraft will fill the roles of CAS, ISR, FAC(A), strike coordination and reconnaissance (SCAR), air interdiction (AI), and JTAC training. The Air Force also believes that manning LAAR aircraft will be a superb way to keep its pilots CAS proficient while F-35s slowly integrate into its squadrons. Additionally, they are hopeful that the less expensive aircraft will lead to partnerships with foreign militaries who cannot afford multi-million dollar fighters.³²

2) The Navy (present day): In August of 2009, the Navy issued a request for forces to provide Central Command with four Embraer EMB-314 Super Tucanos. As a result, the Navy initiated the program Imminent Fury, intended to test the LAAR concept in Afghanistan while simultaneously providing much needed CAS and ISR support for Navy special operators. General Stanley A. McChrystal, at the time, Commander of United States Forces in Afghanistan,

said the planes "will fill this capability gap by leveraging uniquely qualified and experienced aircrew with increased agility of a survivable light attack aircraft integrated with sensors and weapons systems necessary to conduct critical find, fix and finish operations against [al Qaeda] and Taliban networks." The program, costing \$44 million to lease the Super Tucanos, would have been diverted from other Navy funds but was disapproved by Congress in April 2010.³³

3) The Marine Corps (1962): Back in July of 1962, Headquarters Marine Corps issued a specific operational requirement for a Light Armed Reconnaissance Aircraft (LARA). This requirement came about because of increasing insurgency and escalations in South Vietnam, and because the Marine Corps recognized that the O-1 Bird Dogs and OH-43 Huskies of its VMO squadrons were ill suited to wage a counterinsurgency. In his 1964 research project: To Determine the Organization, Missions and Tasks, Tactics, Training and Control of the LARA Where Employed by Marine Corps Forces, Lieutenant Colonel Richard A. Savage, a Marine jet attack pilot and veteran of the Korean War wrote:

Since the cessation of hostilities connected with World War II, military actions that have taken place throughout many areas of the world have shown that limited war is and will be the primary tool of communist aggression. The sure knowledge of the effect of general war on all parties concerned leaves the communist aggressor with no other choice than to find alternative means to pursue his designs.³⁴

The LARA requirement called for a design specifically suited for counterinsurgency.³⁵ The aircraft had to be survivable, with self-sealing fuel tanks and armor plating. It needed an 80-300 nautical mile per hour speed range to be an effective helicopter escort platform and to ensure survivability. The requirement called for an aircraft that could provide timely reconnaissance and be able land in the ground commander's area to deliver it. This meant that the prospective aircraft had to be STOL capable and be able to land on rough unimproved surfaces such as grass fields and secondary roads. It had to have the communications equipment to conduct Naval gunfire observation, FAC(A), TAC(A), and battlefield communications. A limited CAS ability

was required, calling for an aircraft that had hat points and could be armed. Finally, a limited cargo capacity for logistical support was also required.³⁶ What the Marine Corps needed then as it does now is a light versatile aircraft that can operate in austere environments with little support and excel at counterinsurgency.

The aircraft design accepted for the 1962 LARA requirement, was North American Rockwell's OV-10 Bronco, which first flew on 16 July 1965. With a crew in tandem, in ejection seats, it had a bulging canopy and a high wing to provide the aircrew with excellent observation towards the ground. The Bronco's ability to land and takeoff from hastily prepared austere airfields with rough surfaces comes from its robustly designed landing gear. Its surprisingly small 40 foot wingspan allows it to land on nearly any road and its high wing design helps to avoid obstacles while on the ground. The fuselage design allowed for a 3,200 pound internal cargo load, five paratroops, or two litters and an attendant.³⁷

A later variant the Marine Corps pursued was the YOY-10D NOGS. Its modification included the short sponsons being removed, a Forward Looking Infrared (FLIR) turret added under the nose, and an M-197 automatic gun added to the underbelly of the fuselage. The M-197 was 3 barreled, 20 millimeter, off-axis slewable gun, aimed with the FLIR system, which allowed the engagement of targets under the aircraft while in an orbit. Though the YOY-10D NOGS showed success, only four were built because of cuts in program funding as the Vietnam War was nearing its end for America.³⁸

The last combat the Marine Corps' OV-10s saw was in Operation Desert Storm. The two squadrons sent, VMO-1 and VMO-2, maintained a mix of A models for day operations and D models for night operations. Because the A models were not fitted with infrared surprising exhaust stacks like the D models, and because neither models were fitted with the countermeasure systems available today, two OV-10A were shot down by MANPADs. At the

time, U.S. Military's doctrine was largely oriented toward conventional war, and the technological advancements of the day in smart weaponry, stealth technology, and unmanned aerial systems, supported the belief that there was no more need for a Vietnam War era observation aircraft designed for counterinsurgency, to conduct FAC(A). This coupled with the perceived vulnerability of the Bronco, led to its retirement from the Corps in 1994.³⁹

Counter Issues

Because the Marine Corps paradigm of equipping focuses on providing Marines with tools to fight in every clime and place, the equipment it procures should be effective in conventional war as well as in irregular war. Therefore, purchasing an aircraft that excels in irregular warfare, but is vulnerable in a conventional war may seem imprudent. If the Marine Corps must face an opponent who possesses an integrated system of radar guided missiles, the F-35 would theoretically counter the radar threat with its stealth design and helicopters should be able employ nap-of-the-earth terrain flight tactics to remain hidden from the radar threat. A LAAR aircraft would undoubtedly be vulnerable in this high threat environment, but no more vulnerable than the Marine Corps' MV-22s or KC-130s. A LAAR aircraft with a utility capability, such as the OV-10 would still provide needed utility support in the rear area until other forces could neutralize the enemy's radar systems. As in OIF, conventional war gave way to irregular war, a scenario where the LAAR aircraft would excel and bring more value than it would cost.

At a time when the Marine Corps' budget is likely to decrease, its manpower decreased, and important programs cut, any new procurement programs are not likely to be popular. If the unfortunate decision to cancel the F-35B model were made and the Marine Corps were left with only the F-35C model, the LAAR aircraft with an amphibious and STOL capability would be more of a necessity than a luxury. The future is uncertain, and the Marine Corps should procure a cheap platform with superb mission flexibility, regardless of the F-35's fate.

While Unmanned Aerial Systems (UAS) have revolutionized how the United States military conducts many combat missions, the technology has not yet matured enough to remove the pilot from the aircraft in most roles. Because UAS are unable to “see and avoid,” or visually clear themselves as piloted aircraft do, they must be segregated from manned aircraft. UAS do have an equivalent principal, “detect and avoid,” however, neither their sensors nor software are developed enough to allow UAS to adequately detect obstacles and avoid them autonomously.⁴⁰ When it is advantageous to operate more ISR and CAS aviation assets over a small area, such as a counterinsurgency in an urban environment, operating UAS can be prohibitive because of the amount of airspace they require to operate. As UAS appear to be the future of airpower, it is only a matter of time until technology matures enough and the costs are no longer prohibitive, allowing UAS to fill any aviation role. Whether or not all of aviation will remove the pilot from inside the aircraft will remain to be seen, but at present and for the next decade while the transformation takes place, manned systems must be counted on to fill the complex roles.

Conclusion

In a time of budgetary constraint, when many believe the future will be characterized by small, irregular conflicts, the Marine Corps should invest significant effort into examining the LAAR concept. It should be recognized that an inexpensive solution that utilizes appropriate technology would not only better equip Marines for the current fight, but would provide more flexibility for future fights. Because of the low operating cost, the LAAR would save the Marine Corps’ valuable resources. The current fight is overstressing TacAir and rotary-wing assets, which are costly to operate. With the Marine Corps practicing distributed operations in Afghanistan, airpower will no doubt be pressed to provide more support. Resources are getting scarcer, and requirements are increasing, fortunately, the Marine Corps has always excelled at

doing more with less.

As Commander of United States Joint Forces Command, General James N. Mattis, pointed out that “today’s approach of loitering multi-million dollar aircraft and using a system-of-systems procedure for the approval and employment of airpower is not the most effective use of aviation fires in this irregular fight.” He goes on to say, “A Light Attack Armed Reconnaissance aircraft has the potential to shift air support from a reactive threat response, to a more proactive approach that reduces sensor-to-shooter timelines, with immediate and accurate fires, providing surveillance and reconnaissance throughout a mission, while providing communication and navigation support to troops on the ground.”⁴¹

The thrust of this paper is that procuring LAAR aircraft would be beneficial for the Marine Corps. Although this study has only taken a cursory look at possible airframes for the LAAR role, it finds that the OV-10 Bronco would be best suited for it. Specifically, the Vietnam era YOY-10D NOGS with updated systems, avionics, and materials, like the prototype Boeing OV-10X could provide the widest range of support to the MAGTF. The Bronco was and could be an aircraft capable of operating nearly anywhere, ship or shore, and provide the best possible CAS/ISR to America’s ground forces. General G. J. Flynn, the Deputy Commandant for Combat Development and Integration, reminds us: “Old ideas can take on an entirely new life when placed with a new context.”⁴² Old solutions to old problems are often overlooked because mankind’s tendency is to look to the future solutions for future problems. Initiating a new program in a time of budgetary limitations would appear to be imprudent, especially one that centers on 50 year old technology, however this study finds that it would be advantageous. Resurrecting the OV-10 Bronco or purchasing a similar platform would provide significantly flexibility to MAGTF in the conduct of irregular warfare operations.

Notes

¹ Johnson, Wray R. *Vietnam and American Doctrine for Small Wars*. Bangkok Thailand: White Lotus Co., 2001. Pg 6.

² Kilcullen, David. Irregular warfare lecture, Marine Corps Command and Staff, Quantico VA, 29 March 2011.

³ Jogerst, John D. "Preparing for Irregular Warfare: The Future Ain't What it Used to Be." *Air & Space Power Journal*. Winter 2009. Pg 69

⁴ The White House. *National Security Strategy*. Washington DC, May 2010.
http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf
(accessed 15 January 2011), Pg 14.

⁵ Department of Defense. *Quadrennial Defense Review Report*. Washington DC, February 2010. http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf (accessed 5 January 2011). Pg 17.

⁶ Joint Chiefs of Staff. *The National Military Strategy of the United States of America*. Washington DC, February 2011. http://www.jcs.mil/content/files/2011-02/020811084800_2011_NMS_-_08_FEB_2011.pdf (accessed 23 March 2011). Pg 18.

⁷ Department of Defense. *Quadrennial Defense Review Report*. Washington DC, February 2010. http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf (accessed 5 January 2011). Pg 17.

⁸ *The Economist*. "Dancing on the Ceiling". 13 January 2011.
<http://www.economist.com/node/17906039> (accessed 17 January 2011)

⁹ Lamothe, Dan. *Marine Corps Times*. "Cuts to the Corps," 17 January 2011. Pg 16-19.

¹⁰ Capaccio, Tony. *Bloomberg Businessweek*. "Gates Puts Lockheed Marine Corps F-35 on 'Probation,'" 6 January 2011. <http://www.businessweek.com/news/2011-01-06/gates-puts-lockheed-marine-corps-f-35-on-probation-.html> (accesses 19 January 2011)

¹¹ Bennett, John T. *Defense News*. "Vice Chief: U.K. F-35 Switch Based on 3 Factors," 1 Nov 2010. <http://www.defensenews.com/story.php?i=4996597> (accessed 17 January 2011)

¹² Gertler, Jeremiah. *Congressional Research Service Report for Congress*, "Navy F/A-18E/F and EA-18G Aircraft Procurement and Strike Fighter Shortfall: Background and Issues for Congress." December 22, 2009. <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA513534&Location=U2&doc=GetTRDoc.pdf> (accessed 25 March 2011) Pg 5-6. And Rand. *Evaluating the Desirability of Navy F/A-18E/F Service Life Extension Programs (SLEPs)*. http://www.rand.org/content/dam/rand/pubs/technical_reports/2010/RAND_TR844.pdf (accessed 14 March 2011) Pg 11.

¹³ Clark, Colin. *DoD Buzz: Online Defense and Acquisition Journal*. "NavAir Offers F-18 Ammo Amid JSF Woes," 12 January 2010. <http://www.dodbuzz.com/2010/01/12/navair-offers-f-18-ammo-amid-jsf-woes/> (accessed 20 April 2011)

¹⁴ Chown, Christopher. Marine Corps Major and UH-1Y pilot, interviewed about tactics and operations in Afghanistan on 19 Jan 2011.

¹⁵ United States Marine Corps. *Marine Corps Operating Concepts*, Third Edition, June 2010. Pg 40.

¹⁶ Amos, James F. "George P Shultz Lecture." Marine Memorial Club, San Fransisco, CA, 8 February 2011. http://www.marineclub.com/documents/0211_GenAmosSpeechatShultzLecture110208.pdf (accessed 14 April 2011) Pg 6.

¹⁷ Gertz, Bill. *The Washington Times*, "Imminent Fury Needed", 9 June 2010.

<http://www.washingtontimes.com/news/2010/jun/9/inside-the-ring-143559492/?page=1>
(accessed 17 January 2011)

¹⁸ United States Marine Corps. *35th Commandant of the Marine Corps Commandant's Planning Guidance*. 2010. <http://www.marines.mil/unit/hqmc/cmc/Documents/CMC%2035%20Planning%20Guidance%20FINAL.pdf> (accessed 15 January 2011) Pg 9.

¹⁹ Gertz, Bill. *The Washington Times*, "Imminent Fury Needed", 9 June 2010. <http://www.washingtontimes.com/news/2010/jun/9/inside-the-ring-143559492/?page=1> (accessed 17 January 2011) and Clark, Colin. *DoD Buzz: Online Defense and Acquisition Journal*, "NavAir Offers F-18 Ammo Amid JSF Woes," 12 January 2010. <http://www.dodbuzz.com/2010/01/12/navair-offers-f-18-ammo-amid-jsf-woes/> (accessed 20 April 2011)

²⁰ Gertz, Bill. *The Washington Times*, "Imminent Fury Needed", 9 June 2010. <http://www.washingtontimes.com/news/2010/jun/9/inside-the-ring-143559492/?page=1> (accessed 17 January 2011)

²¹ Pietrucha, Michael W. and David J. Torres-Laboy. *Air Land Sea Bulletin*, "Making the Case for the OA-X Light Attack Aircraft." January 2010. <http://www.alsa.mil/library/alsb/ALSB%202010-1.pdf> (Accessed 30 April 2011) Pg 18.

²² Ward, Clifford. Retired US Air Force LtCol, O-2 Skymaster pilot in Vietnam, interviewed about tactics and operations on 19 Jan 2011.

²³ United States Marine Corps. *Marine Corps Operating Concepts*, Third Edition, June 2010. Pg 39.

²⁴ Polmar, Norman. *The Naval Institute Guide to the Ships and Aircraft of the U.S. Fleet*. Annapolis, MD: U.S. Naval Institute 2005. <http://books.google.com/books> (accessed 19 January 2011) Pg 187, 392.

²⁵ Jane's. *All The Worlds Aircraft 1969-70*, North American OV-10 Bronco. Pg 397. and Global Security.org. *LHD-1 Wasp Class*. <http://www.globalsecurity.org/military/systems/ship/lhd-1.htm> (accessed 20 February 2011) and Global Security.org. *LHA-1 Tarawa Class*. <http://www.globalsecurity.org/military/systems/ship/lha-1-design.htm> (accessed 20 February 2011)

²⁶ Jane's. *All The Worlds Aircraft 2010-2011*, Beechcraft (3000) T-6 Texan II. Pg 670. and Hawker Beechcraft, Light Attack AT-6 website. http://www.hawkerbeechcraft.com/military_and_special_mission/light_attack.aspx (accessed 14 March 2011)

²⁷ Jane's. *All The Worlds Aircraft 2010-2011*, Embraer EMB-314 Super Tucano. Pg 36. and Embraer Defense Systems. EMB-314 Super Tucano website. http://www.embraerdefensesystems.com/english/content/combat/tucano_origin.asp (accessed 14 March 2011)

²⁸ Jane's. *All The Worlds Aircraft 2010-2011*, Air Tractor AT-802. Pg 652. and Air Tractor, AT-802U website. <http://www.802u.com/> (accessed 14 March 2011)

²⁹ Weisgerber, Marcus. *Airforce-Magazine.com*, "The Light Attack Aircraft," January 2010. <http://www.airforce-magazine.com/MagazineArchive/Pages/2010/January%202010/0110aircraft.aspx> (accessed 17 January 2011)

³⁰ Weisgerber, Marcus. *Inside The Air Force*. "Boeing Looking to Get Into Light-Attack Market With New OV-10," <http://defensenewsstand.com/> (accessed 17 January 2011) and Boeing. OV-10X Super Bronco concept product card. [http://www.ov-10bronco.net/Technical/boeing_ov-10\(x\)_super_bronco_info_card_2009_01.pdf](http://www.ov-10bronco.net/Technical/boeing_ov-10(x)_super_bronco_info_card_2009_01.pdf) (accessed 17 January 2011)

³¹ Brown, Matthew A. *Marine Corps Gazette*, "TacAir for the 21st Century," March 2011.

Pg 42-43.

³² Weisgerber, Marcus. *Airforce-Magazine.com*, "The Light Attack Aircraft," January 2010. <http://www.airforce-magazine.com/MagazineArchive/Pages/2010/January%202010/0110aircraft.aspx> (accessed 17 January 2011)

³³ Gertz, Bill. *The Washington Times*, "Imminent Fury Needed", 9 June 2010. <http://www.washingtontimes.com/news/2010/jun/9/inside-the-ring-143559492/?page=1> (accessed 17 January 2011)

³⁴ Savage, Richard A. *To Determine the Organization, Missions and Tasks, Tactics, Training and Control of the LARA Where Employed by Marine Corps Forces*. Quantico, VA: 6 February 1964. Pg 1.

³⁵ Jane's. *All The Worlds Aircraft 1969-70*, North American OV-10 Bronco. Pg 397.

³⁶ Savage, Richard A. *To Determine the Organization, Missions and Tasks, Tactics, Training and Control of the LARA Where Employed by Marine Corps Forces*. Quantico, VA: 6 February 1964. Pg 7-12.

³⁷ Jane's. *All The Worlds Aircraft 1969-70*, North American OV-10 Bronco. Pg 397.

³⁸ Gunships. YOY-10D NOGS. <http://www.ais.org/~schnars/aero/gunships.htm> (accessed 20 March 2011)

³⁹ Bronco Net. *Remembering Desert Storm: 10 Years Later*. http://www.ov-10bronco.net/index_desert_storm_10th_anniversary.cfm (accessed 19 January 2011)

⁴⁰ Kowitz, Chuck LtCol. *United States Airforce: Flying Safety Magazine 2006 Year in Review*. "UAS," Jan/Feb 2007. <http://www.afsc.af.mil/shared/media/document/AFD-070927-136.pdf> (accessed 17 January 2011) Pg 38.

⁴¹ Mattis, James M. General USMC, Commander, United States Joint Forces Command, Statement Before the Senate Armed Services Committee, 9 March 2010. <http://www.jfcom.mil/newslink/storyarchive/2010/sp030910.html> (accessed 14 March 2011)

⁴² United States Marine Corps. *Marine Corps Operating Concepts*, Third Edition, June 2010. Pg i.

Bibliography

Air Tractor, AT-802U website. <http://www.802u.com/> (accessed 14 March 2011)

Amos, James F. "George P Shultz Lecture." Marine Memorial Club, San Francisco, CA, 8 February 2011. http://www.marineclub.com/documents/0211_GenAmosSpeechatShultzLecture110208.pdf (accessed 14 April 2011)

Bennett, John T. *Defense News*. "Vice Chief: U.K. F-35 Switch Based on 3 Factors," 1 Nov 2010. <http://www.defensenews.com/story.php?i=4996597> (accessed 17 January 2011)

Boeing. OV-10X Super Bronco concept product card. [http://www.ov-10bronco.net/Technical/boeing_ov-10\(x\)_super_bronco_info_card_2009_01.pdf](http://www.ov-10bronco.net/Technical/boeing_ov-10(x)_super_bronco_info_card_2009_01.pdf) (accessed 17 January 2011)

Brown, Matthew A. *Marine Corps Gazette*, "TacAir for the 21st Century," March 2011.

Capaccio, Tony. *Bloomberg Businessweek*. "Gates Puts Lockheed Marine Corps F-35 on 'Probation,'" 6 January 2011. <http://www.businessweek.com/news/2011-01-06/gates-puts-lockheed-marine-corps-f-35-on-probation-.html> (accesses 19 January 2011)

Chown, Christopher. Interviewed on 19 Jan 2011

Clark, Colin. *DoD Buzz: Online Defense and Acquisition Journal*, "NavAir Offers F-18 Ammo

-
- Amid JSF Woes," 12 January 2010. <http://www.dodbuzz.com/2010/01/12/navair-offers-f-18-ammo-amid-jsf-woes/> (accessed 20 April 2011)
- Department of Defense. *Quadrennial Defense Review Report*. Washington DC, February 2010. http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf (accessed 5 January 2011)
- Embraer Defense Systems. EMB-314 Super Tucano website. http://www.embraerdefensesystems.com/english/content/combat/tucano_origin.asp (accessed 14 March 2011)
- Gertler, Jeremiah. *Congressional Research Service Report for Congress*, "Navy F/A-18E/F and EA-18G Aircraft Procurement and Strike Fighter Shortfall: Background and Issues for Congress." December 22, 2009. <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA513534&Location=U2&doc=GetTRDoc.pdf> (accessed 25 March 2011)
- Gertz, Bill. *The Washington Times*, "Imminent Fury Needed", 9 June 2010. <http://www.washingtontimes.com/news/2010/jun/9/inside-the-ring-143559492/?page=1> (accessed 17 January 2011)
- Global Security.org. *LHD-1 Wasp Class*. <http://www.globalsecurity.org/military/systems/ship/lhd-1.htm> (accessed 20 February 2011)
- Global Security.org. *LHA-1 Tarawa Class*. <http://www.globalsecurity.org/military/systems/ship/lha-1-design.htm> (accessed 20 February 2011)
- Gunships. YOY-10D NOGS. <http://www.ais.org/~schnars/aero/gunships.htm> (accessed 20 March 2011)
- Hawker Beechcraft, Light Attack AT-6 website. http://www.hawkerbeechcraft.com/military_and_special_mission/light_attack.aspx (accessed 14 March 2011)
- Jane's. *All The Worlds Aircraft 1969-70*, North American OV-10 Bronco.
- Jane's. *All The Worlds Aircraft 2010-2011*, Air Tractor AT-802.
- Jane's. *All The Worlds Aircraft 2010-2011*, Beechcraft (3000) T-6 Texan II.
- Jane's. *All The Worlds Aircraft 2010-2011*, Embraer EMB-314 Super Tucano.
- Jogerst, John D. "Preparing for Irregular Warfare: The Future Ain't What it Used to Be. *Air & Space Power Journal*. Winter 2009.
- Johnson, Wray R. *Vietnam and American Doctrine for Small Wars*. Bangkok Thailand: White Lotus Co., 2001.
- Joint Chiefs of Staff. *The National Military Strategy of the United States of America*. Washington DC, February 2011. http://www.jcs.mil/content/files/2011-02/020811084800_2011_NMS_-_08_FEB_2011.pdf (accessed 23 March 2011)
- Kilcullen, David. Irregular warfare lecture, Marine Corps Command and Staff College, Quantico VA, 29 March 2011.
- Kowitz, Chuck LtCol. *United States Airforce: Flying Safety Magazine 2006 Year in Review*. "UAS," Jan/Feb 2007. <http://www.afsc.af.mil/shared/media/document/AFD-070927-136.pdf> (accessed 17 January 2011)
- Lamothe, Dan. *Marine Corps Times*. "Cuts to the Corps," 17 January 2011: 16-19
- Mattis, James M. General USMC, Commander, United States Joint Forces Command, Statement Before the Senate Armed Services Committee, 9 March 2010. <http://www.jfcom.mil/newslink/storyarchive/2010/sp030910.html> (accessed 14 March 2011)
- Pietrucha, Michael W. and David J. Torres-Laboy. *Air-Land Sea Bulletin*, "Making the Case for the OA-X Light Attack Aircraft." *January 2010*.

-
- <http://www.alsa.mil/library/alsb/ALSB%202010-1.pdf> (Accessed 30 April 2011)
- Polmar, Norman. *The Naval Institute Guide to the Ships and Aircraft of the U.S. Fleet*. Annapolis, MD: U.S. Naval Institute 2005. <http://books.google.com/books> (accessed 19 January 2011)
- Bronco Net. *Remembering Desert Storm: 10 Years Later*.
http://www.ov-10bronco.net/index_desert_storm_10th_anniversary.cfm (accessed 19 January 2011)
- Rand. *Evaluating the Desirability of Navy F/A-18E/F Service Life Extension Programs (SLEPs)*.
http://www.rand.org/content/dam/rand/pubs/technical_reports/2010/RAND_TR844.pdf
(accessed 14 March 2011)
- Savage, Richard A. *To Determine the Organization, Missions and Tasks, Tactics, Training and Control of the LARA Where Employed by Marine Corps Forces*. Quantico, VA: 6 February 1964.
- The Economist*. "Dancing on the Ceiling," 13 January 2011.
<http://www.economist.com/node/17906039> (accessed 17 January 2011)
- The White House. *National Security Strategy*. Washington D.C., May 2010.
http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf
(accessed 15 Jan 2011)
- United States Marine Corps. *Marine Corps Operating Concepts*, Third Edition, June 2010.
- United States Marine Corps. *35th Commandant of the Marine Corps Commandant's Planning Guidance*. 2010. <http://www.marines.mil/unit/hqmc/cmc/Documents/CMC%2035%20Planning%20Guidance%20FINAL.pdf> (accessed 15 January 2011)
- Ward, Clifford. Retired US Air Force LtCol, O-2 Skymaster pilot in Vietnam, interviewed about tactics and operations on 19 Jan 2011.
- Weisgerber, Marcus. *Airforce-Magazine.com*, "The Light Attack Aircraft," January 2010.
<http://www.airforce-magazine.com/MagazineArchive/Pages/2010/January%202010/0110aircraft.aspx> (accessed 17 January 2011)
- Weisgerber, Marcus. *Inside The Air Force*. "Boeing Looking to Get Into Light-Attack Market With New OV-10," <http://defensenewsstand.com/> (accessed 17 January 2011)